

WHAT IS CLAIMED IS:

1. An ultra wideband antenna, comprising:
a number of cavity embedded meander line loaded antenna modules having non-overlapping bands of operation; and
a common feed to said modules.
2. The antenna of Claim 1, wherein said modules are nested one within another.
3. The antenna of Claim 1, wherein said modules are serially connected together.
4. The antenna of Claim 1, wherein each of said modules has an outer conductive cavity, and further including a ground plane plate above said cavities, a meander line at the top of said outer conductive cavity having an end coupled to said cavity, and means for coupling an end of said meander line to said ground plane plate.
5. The antenna of Claim 4, wherein said coupling means includes a capacitive coupling between said meander line and said ground plane plate.
6. The antenna of Claim 4, wherein said coupling means includes a conductor for coupling said meander line to said ground plane plate.
7. The antenna of Claim 4, wherein said ground plane plate is divided into two sections and wherein said common feed is coupled across said two sections.
8. The antenna of Claim 7, wherein said common feed includes a balanced line.

9. The antenna of Claim 8, wherein said balanced line is connected across the closest adjacent points on said sections.

10. The antenna of Claim 4, wherein said ground plane plate is divided into four sections and wherein said common feed is coupled across said sections to effectuate a predetermined polarization for said antenna.

11. The antenna of Claim 10, wherein said polarization is selected from the group consisting of horizontal polarization, vertical polarization, right hand circular polarized and left hand circular polarization, polarized and left hand circular polarization.

12. The antenna of Claim 1, wherein the antenna pattern is in the form of a loop across said bands of operation.

13. A method of providing an ultra wide band antenna having a loop type antenna pattern over the bands of operation of the antenna, comprising the steps of:

nesting a number of cavity embedded meander line loaded antenna modules having different non-overlapping bands of operation; and,

providing the antenna modules with a common feed, whereby any side lobes are minimized such that there is no significant null in a direction perpendicular to the face of the nested modules.

14. The method of Claim 15, wherein the bands of operation of the modules are contiguous and wherein any bandwidth overlap does not result in any substantial null in a direction perpendicular to the face of the nested modules.
15. The method of Claim 13, wherein the modules are serially connected.
16. The method of Claim 1, wherein the ultra wide band antenna is used for surveillance from an over flying platform.
17. A compact flush-mountable ultra wide band antenna, comprising:
a number of nested cavity embedded meander line loaded antenna modules, each of said modules having an electrically conductive cavity having a top periphery, an apertured dielectric layer at said top periphery, at least one meander line on said dielectric layer and having an end electrically connected to said cavity, a ground plane plate above said meander line and a coupler for coupling another portion of said meander line to said ground plane plate, the aperture in said dielectric layer being of a size to permit the insertion of a smaller cavity therethrough to permit said nesting; and,
a common feed for said antenna modules, said modules having substantially non-overlapping bands of operation.
18. The antenna of Claim 17, wherein said ground plane plate is divided into sections and wherein said feed includes a pair of conductors coupled to different sections.

19. The antenna of Claim 18, wherein said ground plane plate is divided into four sections such that said antenna can be driven so as to provide a horizontally polarized, a vertically polarized, a right hand circularly polarized and left hand circularly polarized antenna pattern.

20. The antenna of Claim 19, wherein said sections are triangularly shaped.

21. A cavity-embedded antenna comprising:

a ground plane having a cavity depending therefrom in a central region thereof;

a slotted plate spaced from said ground plane and overlying the opening of said cavity, said plate having a pair of crossed slots therein defining a pair of bowtie antennas, said bowtie antennas having triangular-shaped elements, the apices of opposed triangular-shaped elements forming feed points for the associated bowtie antennas;

a number of shunting elements across the distal ends of respective slots, the spacing of said shunting elements to said apices determining the transmission line impedance associated with the slots, whereby said antenna is loaded by said slotline transmission lines.

22. The antenna of Claim 21, wherein the distal ends of said slots are terminated by said plate, the distal ends of said slots being closed.

23. The antenna of Claim 21, wherein the distal ends of said slots are open and wherein said shunting elements are sufficiently close to the distal ends of said slots that

the associated transmission lines provide the requisite impedance to cancel the reactance of said antenna.

24. The antenna of Claim 21, wherein said shunting elements include conductive material so as to short respective slots at said shunt elements.

25. The antenna of Claim 21, wherein said shunting elements include lossy dielectric material having a resistivity to provide that said shunting elements act as absorbers.

26. The antenna of Claim 25, wherein said lossy dielectric material is in the form of a resistive plastic sheet.

27. The antenna of Claim 21, wherein said pair of bowtie antennas are fed at respective feed points such as to give said antenna a linear polarization or a circular polarization, depending on the phasing of the signals applied to said feed points.

28. A method for providing a wide bandwidth to a cavity-embedded quadrature-phased antenna including opposed bowtie antennas adjacent the cavity thereof, the bowtie antennas having a crossed slot structure between the bowtie elements thereof, comprising the steps of:

shunting the slots between adjacent bowtie elements with shunts, such that said slots function as transmission lines; and,

adjusting the position of the shunts such that the transmission line impedance associated with the slots cancels the reactance of the antenna across the operating bandwidth thereof.

29. The method of Claim 28, wherein the cavity of the cavity-embedded antenna has a side/depth ratio greater than 3.

30. The method of Claim 28, wherein said shunts include electrically conductive material so as to short the slotted transmission lines.

31. The method of Claim 28, wherein said shunts include absorptive material in the form of a lossy dielectric.

32. A method for reducing the cost of a wide bandwidth quad type bowtie cavity-embedded antenna over that associated with a meander line loaded quad type bowtie antenna formed by the gaps between adjacent bowtie elements, comprising the step of replacing the meander lines that permit a miniaturized antenna to have sufficient gain over a wide bandwidth with shunts across the slots of the antenna, the shorted slotted transmission line formed thereby providing an impedance that reduces or cancels the reactance of the antenna over the operating bandwidth thereof.

33. The method of Claim 32, wherein said shunts include electrically conductive material so as to short the associated slots.

34. The method of Claim 32, wherein said shunts include absorptive material in the form of a lossy dielectric.

35. In a quad configuration bowtie-type cavity-embedded antenna having bowtie elements spaced apart in a single plane to form slots that are shunted to provide a wide bandwidth operation, the bowtie elements lying in spaced adjacently to the cavity of the antenna, the cavity having a top portion that exists as an aperture in a ground plane, a method for controlling the capacitance of the antenna, comprising the steps of:

providing that the distal ends of the bowtie elements extend outwardly beyond the top periphery of the cavity to overlap the ground plane;

spacing the bowtie elements an adjustable distance above the ground plane carrying the cavity; and,

adjusting the spacing of the bowtie elements above the ground plane, thus to adjust the capacitance of the antenna.

36. The method of Claim 35, and further including the step of adjusting the overlap to adjust the capacitance of the antenna.

37. In a quad configuration bowtie-type cavity-embedded antenna having bowtie elements spaced apart in a single plane to form slots that are shunted to provide a wide bandwidth operation, the bowtie elements lying in spaced adjacently to the cavity of the antenna, the cavity having a top portion that exists as an aperture in a ground plane, a method for controlling the capacitance of the antenna comprising the steps of:

locating the bowtie elements at the top of the cavity; and,

providing that the distal ends of the bowtie elements extend downwardly into the cavity to form downwardly-depending tabs, the spacing of the downwardly-depending tabs from the cavity walls permitting adjustment of the capacitance of the antenna.